BALL STATE UNIVERSITY AND THE CITY OF MUNCIE:

BRINGING A BIKE SHARE TO THE COMMUNITY THROUGH FEDERAL FUNDING

A CREATIVE PROJECT

SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

MASTERS OF URBAN AND REGIONAL PLANNING

BY

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Abstract

CREATIVE PROJECT: Ball State University and the City of Muncie: Bringing A Bike Share To The Community Through Federal Funding

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This project aims to show the history of bike share programs and how they have come to shape the different systems that are in existence in the world to date. Through this reference and examination of the history and case studies both local and international, a conclusion of the appropriate program for Ball State University and the City of Muncie will be determined. Upon selecting the proper system for the area in question, a federal grant will be written on behalf of Ball State University with the partnership of the City of Muncie to secure funding for the establishment of Ball Bikes, a locally operated bike share program that is aimed to promote bicycle usage and healthy lifestyles within the community.

Acknowledgments

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Part One: Milestones & Comparison

Shared mobility is a reference to the ability that one holds in the shared used a vehicle, bicycle, or some other form of transportation mode. The concept that that a user has the ability to access the different forms of transportation on an as-needed basis. Each form of shared mobility services has unique characteristics that have wide ranges of impacts on the environment, the user, current and future developments of the cities and towns, and reduction in private vehicle ownership. For this create project, there will be a focus of shared mobility that does not contain the use of a vehicle but rather bicycles and scooters.

To understand a mobility share system, whether it be docked or dockless, it is crucial to take a look back to the original advocates and programs that have existed over that past 50-60 years. The earliest attempts and processes have shaped the programs that the world has come to know. In some cases, it is still possible to spot similarities to program currently. The following are a few key milestones that came be found over the years of mobility share systems. At this point in the document, the programs are being referred to as mobility share systems. As the reader will note, further in the timeline of events, there is a shift/addition in the device of choice for transportation.

Following the milestones, we will take a closer look at two different mobility share systems including the docked and dockless bike share. Through this analysis and brief representation of the two various applications, it will be possible to grasp an idea of what sort of system would make the most sense for implementation within Ball State University and the City of Muncie. However, this brief analysis only provides a portion of the information needed to fully grasp the concept and programming necessary. This is when it becomes crucial to begin

examining programs that are currently in practice in different locations. This analysis of case studies will follow in part two of this document.

Milestones

1960's – The White Bicycles

During the 1960's a Dutch counterculture movement within the Netherlands, began with a focus of provoking violent responses from authorities through the use of non-violent bait. This counterculture was known as the Provo Movement. The political wing of the Provos won a seat within the city council of Amsterdam, where they then developed the White Plans. Generally, the plans were sought to address different social problems with the thought of creating a more livable city. Of these plans, the most famous was that of the White Bicycle Plan, which had a focus on improving the transportation issues that were occurring at the time.

Figure 1 The White Bicycle Plan (Provo and the 1966 White Bicycle Plan, 2014)

The White Bicycle Plan proposed the closing of Central Amsterdam to all motorized traffic, also including motorbikes, with the intention of improving the public transportation frequency. The goal was to see a 40% increase in ridership and to save over two million Guilders (currency before 2002) per year. The only accepted motor vehicle was the taxi as it was a form

of public transit, but it was only allowed under the stipulations that the car would only be electrically powered and contained a maximum speed of 25 mph.

The main concept of this plan is one of the first known proposed bicycle sharing systems in the world. The proposal stated that the municipality would buy 20,000 white bikes per year, which would be the property of the public and free to be used by anyone (Provo, 2006). This plan was rejected by the city authorities, but the Provos decided to continue with their efforts anyway. In an attempt to produce their plan, the Provos painted 50 bikes white and left them around the streets unlocked for the public to use at their convenience. It only took a few weeks for these bikes to eventually be impounded as they violated the municipality's guidelines of requiring that all bikes be locked up along city streets and canals. To counter this issue, the Provos locked the bikes and painted the lock combinations on the bike.

With no structure and guidance, the bikes lasted just a couple of weeks before the White Bicycle Plan was officially seen as a failure. Either stolen, impounded, or deep in one of the city's canals, the White Bicycle Plan concluded. However, The White Bicycle Plan would later be seen as the inspiration in the timeline of bike sharing worldwide.

1995 – Free Rides

Unlike its Dutch predecessor, Copenhagen City Bikes (Bycyklen) was Denmark's first organized large-scale urban bike sharing system. This system was operated on the basic elements of coin deposits, fixed stands, and specifically designed bikes with uninterchangeable parts with regular bicycles. Some of the parts included forks, handle bars, and seat posts that were only compatible with the bikes that belonged to the Bycyklen program.

Initially introduced at a small scale, the program intended to respond to the issue of theft. With 27,000 bicycles stolen a year within Denmark, the issue of theft was a large one and the

entrepreneurs of the program felt that by creating a system that insurance companies would be willing to sponsor, they would receive a form of a financial benefit as there would be a reduction in the number of bikes stolen per year (Machine, Bycyklen Historie, 2010).

In the initial stage, the system was highly unsuccessful as the intended sponsors did not come through, keeping the growth of the system at a minimal level. It wasn't until the backing and support from the City of Copenhagen and private investors, organizations, and foundations, did Copenhagen City Bikes see the outcomes that they were hoping to achieve. The success was through the introduction of 1,500 bicycles throughout the city. The growth increased over the years until its final years in the mid-2000s (2010).

The elements that were put into place to set these bikes and system apart from the White Bikes were seen as a deterrent to theft. However, these elements did not quite achieve the level of anti-theft that was desired. The coin-operated component of the system allowed for an individual to check out a bike by providing a coin at the stand. The user would then receive a coin when the bicycle was returned either to the stand it was rented from or to one of the other stands dispersed amongst the city. However, the value of the bike commonly trumped the value of the coin and theft continued. The presence of fixed stands and having non-interchangeable parts with current bicycles at the time did help decrease the theft of the system's bicycles.

1996 – Card Identity

In the United States, the Bikeabout share program of Portsmouth University is arguably one of the first smart technology achievements for the bike share community. In 1996, Bikeabout came to be known for its system that used a magnetic stripe card for rental of a bike. This is one of the most significant contributors to the control of bike theft. The system worked similarly to that of a library card or debit card (Black, et al., 1998). The user was associated with the card, so

whenever they wanted to use a bike, they would check one out with a simple swipe of their card. If the bike was not returned within the allotted amount of time or were returned damaged, the user's card would be charged an additional fee. This system did not entirely wipe out the theft that occurred, but it did drastically decrease it as there was a way to track the bike back to the last user. However, the system could still not monitor where the bike was or had been.

While Bikeabout was a catalyst of the use of smart technology associated with bike sharing, Bikeabout failed to reach the expectations of its creators by failing to meet the ridership that was anticipated. Plagued by a small startup budget, Bikeabout never reached its full potential with a limited amount of bikes and kiosks from the very beginning. Having a limited quantity of bikes and kiosks due to a low budget, the gap between growth and failure was never crossed as ridership never appeared high enough to bring forth revenue to fund future bicycles and kiosks. With limited ridership, and disputes of unjustifiable charges for bike damages, these problems and opposition brought Bikeabout to its final days just three years after establishment (1998).

2000 – Call a Bike

Call a Bike, by Deutsche Bahn in Germany, was one of the first official dockless bike share systems and is still operated at this time. With no fixed location, bike security is an essential part of this system. The bikes are secured through an electronic wheel lock and cable lock that are both controlled by an embedded microcontroller that contains a unique set of lock/unlock codes. The activates a two-step process from the start of the ride to the conclusion. Step one was the hiring process where an individual calls the number on the bike and presents the bike's ID number where the user would then receive a four-digit opening code in return. Step two is the returning procedure, where the user locks the bike to a fixed location and selects return bike from the bike's touch screen. At the Call A Bike's initial development, the user would then

receive a code that would have to be called into the control center where they would then provide an exact location for the bike. However, as time and technology progressed, this step was removed as the bikes now contain GPS tracking devices (Smart Mobility, 2019). Arguably, this was just the beginning for dockless ride share systems in the world.

Figure 2 DB Call-A-Bike in Munich. Photo by author

2008 – Other bike share programs in the US

In the pursuit of bringing higher bike usage to Washington, DC and the United States as a whole, SmartBike DC was created as a pilot program that contained 120 bicycles anchored at ten automated rental locations. This operation was the first of its kind that was known to have existed in North America, separate from Portsmouth University's program (Silverman, 2018). The program was the product of a private-public partnership between the District of Columbia Department of Transportation (DCDOT) and an advertising firm that operated similar automated bike share systems in Europe. Due to communication issues between the public-private partnership, the program was dropped by the Department of Transportation. In 2010, a new partnership was created with Arlington County, Virginia to create the program that is now known by the name of Capital Bikeshare.

Upon the closure of the SmartBike DC program, the advertising firm known as ClearChannel, that had privately invested, donated all of the bikes to a Baltimore Charity and removed all of the stations at the firm's expense. Despite the termination of the program, SmartBike DC was considered a success, as it was able to provide proof that the Capital Bikeshare Program could and would succeed and that the programming was a viable choice for systems across the nation.

Figure 3 SmartBike DC (Fagen, n.d.)

2007 - Velib'

Velib' was a large scale public bike sharing system that was launched in Paris, France in 2007. The system was established with over 14,500 bicycles and 1,230 stations located throughout Paris and the surrounding municipalities. In just four years, Velib' saw an average daily ridership of nearly 89,000 trips and continued to see an increase each year till their closure in 2017 (Bilian des deplacements a Paris 2011, 2015). To use the system, users had to take out a subscription that allowed the users an unlimited number of rentals per the subscription type. Subscription types were daily, weekly, and yearly. Velib' was faced with many challenges over its lifespan including over 3,000 bicycles being stolen in the first year of operation, vandalism to the property, overcharges, and programming issues known as the blue screen of death that would

come about on the docking stations as there were issues with the Microsoft software that was being utilized.

Figure 4 Velib' Paris France (Soares, 2017)

2009 – BIXI

BIXI, of Montreal, is the hybrid of a bicycle and a taxi with the understanding that you could use a bike as a taxi to get to and from different locations. The concept was that a site contained a pay station, bikes, bike docks, and was outfitted with solar panels. However, the importance of this system came about through its programming components. The entire technological platform behind the system included wireless bike stations, an off-grid approach through on-site power system, and finally the usage of mobile app was used to locate and view the status of bike docking stations in proximity to users (Lau, 2008). This program and system were extensively utilized elsewhere by other bike share organizations in the following years.

2010 – American Dream Rebranded

Capital Bikeshare existed through a terminated contract by ClearChannel of the SmartBike DC program. However, the initial contract was somewhat altered to eliminate any appearance of the original private funders rather than being completely terminated. This action ended up being a rebranding as the procedures were still followed under the new program name.

With an implementation cost of over $5 million, Capital Bikeshare sought funding through public contributions including grants from the Virginia Department of Rail and Public Transport (VDRPT) and the United States Department of Transportation. The initial startup costs of this program included the introduction of 400 bicycles and 49 stations, and within a year had reached 18,000 members and over one million rides, doubling the initial expectations (Kaplan, 2010). With the help of the BIXI-branded system provided by the Montreal based company, Capital Bikeshare grew astronomically as a case study for other cities within the United States that shared an interest in creating a more bike-friendly community through a docked bike share system.

Figure 5 Capital Bike Share DC (Giambrone, 2019)

2013 – Growing Inventory

Beginning to appear in large quantity, bike share systems were increasing at 60% globally with 65 new operations in China alone. Contributing to this global was the launch of Citi Bike in New York City. Initially planned for 2011, Citi Bike was delayed due to the unforeseen circumstances of Hurricane Sandy. However, Citi Bike took this delayed opening to their advantage, and addressed some technical errors that were found. Opened in 2013, Citi Bike

established 332 stations and over 6,000 bikes, forming the beginning of what will later become the most extensive bike sharing program in the United States and the worlds as of 2017. Citi Bike would also hold the record for the largest first phase system to be implemented in the United States. However, examining every system in the world, Citi Bike only held 0.8% of the worlds bike-share bicycles in 2013, meaning that many of the operations that existed were much smaller in comparison.

A private-public partnership played a crucial role in the implementation of the Citi Bike program. Named after the leading sponsor/partner, Citigroup, Citi Bike is operated under a company that operates bike share systems around the United States by the name Motivate. This company held a key position as they later become the owner of 8D technologies that were vital to the success and growth of BIXI (Flegenheimer, 2012). This key position is critical, as the ownership of 8D technologies allowed for Citi Bike to continue expanding with the usage of BIXI owned programming, 8D Technologies.

Figure 6 Citi Bike NY (Fitzimmons, 2015)

2014 – BIXI and Bankruptcy

Created and first implemented in Canada, Société de Velo en Libre-service (SLVS) operated BIXI to help build their initial success of the program and 8D Technologies. However, shortly after, disputes amongst SLVS and BIXI occurred, due to a change in technology usage, which in the end brought BIXI to bankruptcy. 8D technologies took this time to branch out and begin their new partnership with Alta Bike Share, who would later become known as Motivate. It was this partnership that brought forth great success to Citi Bike as the owner was now partnered with the key programmer of the system. This partnership quickly shifted to a merger with Motivate, who continues to supply 8D Technologies with its bike share programs that they operate throughout the United States (Wright, 2014).

2015 – Larger than life

Just two years prior, the world saw 700,000 bike share bikes dispersed around their cities with no indication of stopping, but rather showing signs of growing faster as more providers and system types begin to appear (Goodyear, n.d.). While not every bike share program in the world is as extensive as that of Citi Bike in New York or Velib' in Paris, now known as Velib' Metropole, investors and startups thrive on potential success. Specifically, China as a growth sector in that 75% of all bike share systems are located there. While this ambition is a driver to the success of bike share systems, too many bikes or share systems in a given area can lead to

failure. In particular, the large number of operations located in China, at the point of this project publication, have shown issues of overcrowding, funding, poor usage, and vandalism/misuse.

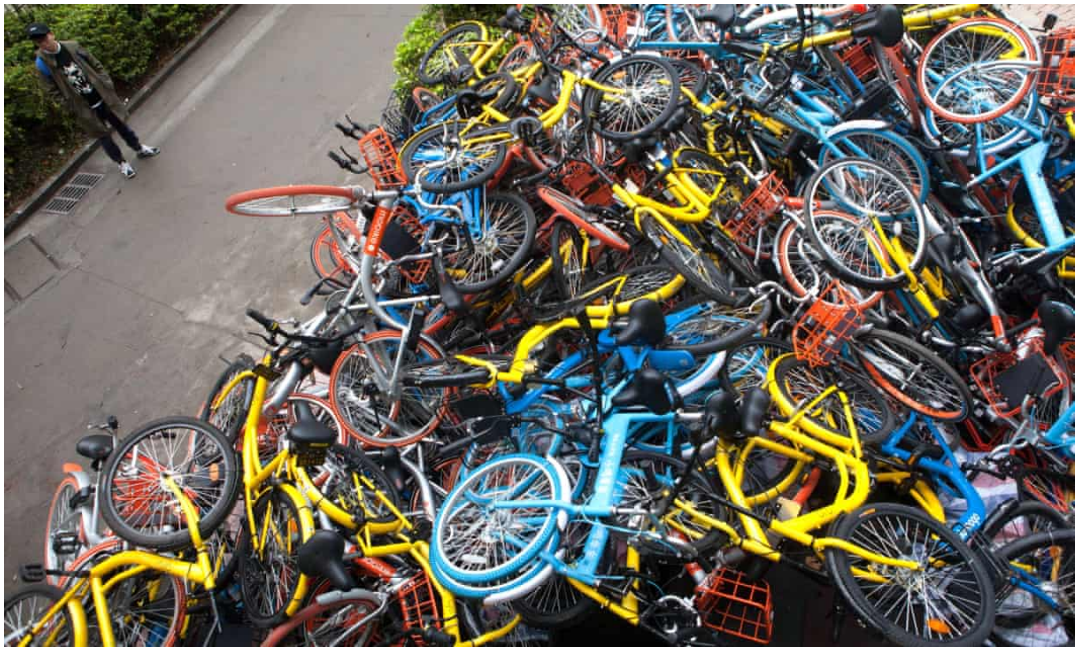

Image 7 Overabundance of bike share bicycles in China (Mead, 2017)

2017 – Scooter takeover

With every launch of a bike share system that has occurred over the years, each one has experienced some rendition or change to alter how it looks or functions. However, 2017 saw what might be seen as the most significant alteration to a bike share program that has existed to date. Rather than using a bike, users in cities across the United States, Europe, and Asia were offered a new experience of using an electric assisted scooter. The system and programming were not altered, but rather the mode of transportation was. The innovators of the scooter share modeled their systems off that of the dockless bike share programs that showcased the ability to start and end a ride anywhere without the need of a docking station.

Being a new vision of transportation with its low cost, enjoyable ride, and no energy exerted from the user, investors and companies quickly took advantage and started implementing scooter shares in cities across North America, Europe, and Asia. However, these cities quickly received backlash as the scooter providers often deployed quickly and asked for forgiveness from the municipalities later. Scooter systems were commonly brought to cities with limited coordination of local governments and were dropped into the community without notice or regulation. Lack of rules and unclear usage guidelines led to many issues which in some cases led the local government to ban scooters entirely within their cities until further review (Electric Scooters: Why Are So Many 'Progressive' Cities Banning Progress?, 2019). Electric scooters are considered a motorized vehicle and under this definition, they are subject to more regulations that challenge the municipalities to create rules and regulations that would fit the scooters appropriately.

Figure 8 Dockless electric scooters. Chicago. (Greenfield, 2018)

2018 – Cities fight back

In the wake of the scooter phenomenon, local governments were forced to take action toward the scooter share systems that were appearing and becoming disturbances. Cities such as

Indianapolis took action by creating ordinances to regulate any current or future uses of the scooter share systems. Indianapolis created Proposal 120, which spells out the requirements to be met. For example, the ordinance included guidelines about their removal from the public right-of-way, parking requirements, and license requirements of the provider.

In some instances, the regulations created by local governments have caused some scooter companies to pack up and leave the respective cities. For example, Lime and Bird were forced to leave Raleigh, North Carolina, because of the regulations and increased fees that were to be imposed to operate within the city limits. When these providers leave, communities are often left with mixed emotions.

Program Comparison

This portion of the creative project will pull out specifics ideas, points, and thoughts and examine how they pertain to the usage of docked vs. dockless bike share systems. It is crucial to further understand the differences of that of a docked bike share program versus a dockless program.

Dockless bike share programs are designed for short and typically sporadic trips as it is possible to dismount and remount a dockless bike share bike in any location that the user desires. However, most dockless systems operate at a $1 per ride, which in many cases puts a strain or barrier on the demographic using the system. For example, in San Francisco, the cost of a dockless bike for the usage of a whole day becomes overpriced to its counterpart, the docked program (San Franciscans Get Taken For a Ride - A Price Comparison of Bike Share From Around the World, 2017).

When using a dockless bike, one can conclude or start a ride from almost any location as the bikes do not have to reside at a dock. This idea of being able to ride to and from any place

can be seen dating back to the Provo white bike movement from the 1960s. Similar behavior to the counterculture movement, many municipalities experienced a lack of consultation between the operator and the city. This lack of communication meant that the cities were not well prepared for the system to exist and operate smoothly. Seattle, in 2017 suspended its first bike share Pronto, who did not consult or work with the local government and is now working with other operators like Spin and LimeBike so that they can be successfully implemented into the city with relevant rules and regulations (What is Dockless Bike Share, n.d.).

Two of the most substantial issues that are found still to date with dockless systems, similar to the problem mentioned in the prior milestones, consist of theft/vandalism and improper usage issues. Theft and vandalism is inevitable, but dockless system providers have and will continue to improve security and limit theft. When dockless bikes first started to make their appearance, it wasn't uncommon to begin finding bikes in odd locations. For example, there have been many reports of bicycles ending up in bodies of water, in trees, and being locked inside of private residences where they are not accessible to the general public. One of the earliest deterrents of these issues was a requirement that the users had to submit a picture of the bikes location upon the conclusion of the ride as seen with the Call a Bike system in Germany. The requirement of submitting a picture of the bike's location did not eliminate the bikes from being found in the previously listed locations. This was later determined through observations that showed that the bikes were being put in these locations by random citizens that came across the bikes and not by the individual who had last utilized the bicycle.

Today, many operators have now included an alarm and GPS tracking systems within their bicycles. The alarm system is activated when the bike has been lifted or attempted to be moved without the bike being activated or unlocked. Arguably the most beneficial advancement

was the placement of tracking devices within the bikes. Not only does this allow for data to be collected and used to benefit and grow the program, but will always inform the operator where the bikes are at all times.

While theft/vandalism are significant issues that are still present, the biggest problem arises from the critical component of the program. The issue is that users can terminate their rides time without having to return the bike to a designated location. More specifically, when a rider is using a dockless system, one of the sites that they possibly would be riding to would be their place of business. Once they have reached this location, they can then terminate their ride and walk away from the bike with no worry. However, when terminating a ride the bike that the person was using is left sitting in until a new user arrives. In some cases a new user can appear very soon, or the next user doesn't come at all, leaving the bike to be relocated by a bike wrangler at the end of the day. Also observed with dockless bike share bikes is that a user will terminate their rides in a location that is not considered appropriate. Examples of this can be seen in nearly any country or city that contains a dockless program. Bikes are haphazardly left in areas that begin to impede in the right-of-way of pedestrian foot traffic and vehicular traffic as seen in Figure 9. Not only are there issues with bikes impeding on the areas of right-of-way but they are also overrunning areas of recreation. For example, individual commonly utilize dockless bikes to enter and utilize parks but then decide not to use their bike when they are about to leave. When the user decides not to use the bike when they leave, the user has now created an issue for other users and the operators. Another similar issue is that of bikes being left in the public right-of-way within park spaces. The bikes that have now been left in the park are often neglected as users are less inclined to enter a park and search fields for a bike to use as seen in Figure 10. Leaving bikes in the parks also creates and issue for the operator as many parks do not allow

vehicles to drive through them unless they are maintenance vehicles. This means that the bikes are typically left within the parks for long ranges of times due to the inability of the bike wrangles to collect and redistribute the bikes elsewhere. While these issues might not seem like the most significant or most cumbersome, its these issues that have become big enough in different cities around the world to the point in which dockless programs have been banned indefinitely.

Figure 9: Impeding Foot Traffic Space in Munich Germany. Photo by author, 2019

Figure 10: Terminated in a Park Munich, Germany. Photo by Author, 2019

While there are several pros to the efforts of the dockless programs, the cons seem to overweigh the advantages in both cyclists and communities. However, if a municipality is prepares, a dockless program could be successful. Table 1 offers a few of the pros and cons to a dockless program.

PROS:	**CONS:**
Less if utilized for one ride a day	Impedes the public right of way
Easier access to and from different locations	Expensive if being used for a full day
Lower startup cost for the municipality	Easier to be stolen or vandalized
Wider travel radius	Typically requires a cellular device to access
Promotes equity through dispersal	Large travel radius = greater distance to cover when bike wrangling

Table 1: Pros and Cons to Dockless Systems
Table by author.

A docked bike share program is very similar to that of the dockless system except for the concept that the bikes are to be located at a docking station at both the beginning and end of a ride. This concept can be seen dating back to the 1980's and 1990's when European countries were seeking to promote the usage of bicycles and promote green concepts within the city centers. It was also seen on college campuses as it promoted and provided a system of transportation to students that might not be able to afford a car or not want one. These ideas and concepts have stayed active as they are some of the significant contributors as to why bike share systems still exist.

Typically a dock will contain a kiosk or some interactive device that allows for a user to create an account and or check out one of the bikes in which are present and available. A dock will contain on average, anywhere from 10-15 slots in which a bike can be returned. However, there is typically only half to two-thirds of those slots filled with bikes at the start of the day. Instead of filling every slot, this allows for future riders to have the ability to return their bike at this station. Most riders are going from one destination to another and are less inclined to ride a loop that returns back to the point of origin. Even with extra slots at the docking stations, there still seem to be issues, but they are more commonly associated with the different times of the day. For example, during business hours, there are issues of traffic congestion leaving very few bikes to be used. During off hours, the docking stations tend to become full, making it challenging to store extra bikes (Kass, 2018). When a user has difficulty returning their bike upon the termination of their ride, this issue is associated with only the docked system and not the dockless.

Figure 11 Docking station with empty slots New York.(Sider, 2016)

Docked systems commonly operate with the users paying a certain fee at the start of the ride with the understanding that after 30-60 minutes, and every 15 or so minutes after that, there is an additional fee added to the bill, as seen within the Pacers Bike Share program that is operated in Indianapolis, Indiana. To avoid these additional fees, many users, who aren't are not members of the programs, tend to find a station that is close to their destination or along their route so that they can return the bike before their 30-60 minutes is up. In some cases, these users will then check it out again or just complete their ride there. However, if stations are congested and overfilled with bikes, users are commonly faced with the dilemma of frantically searching for an empty docking station or being forced to pay additional fees. This is sometimes a common occurrence amongst major tourist or commuter routes. It is common to start noticing docking stations containing more than the average amount of docking slots long these areas and routes. Additional fees are what contribute to promoting the yearly and monthly memberships that the operators commonly offer. These memberships allow the user the ability to avoid the extra fees or higher costs per ride. However, these memberships are usually only used by individuals who use the system daily.

Other than the costs that are associated with the docked programs, the second issue that arises is the limited access. Docked bike share systems are commonly and strategically placed at locations of interest such as transportations hubs, large business sectors, and points of tourism. However, when examining a city, these locations are not always closely related and in some cases are extremely segregated from other areas where users may exist or want to travel to and from by bicycle. Docked systems across the country have an issue with equity as the docked stations work better in areas of high density and mixed-use neighborhoods. These are the places that contain high rents and more commonly, the affluent individuals and families (Schneider,

2017). While the system has grown and matured, the demographic remains the same: wealthier and whiter than the cities in which the programs are serving. The income disparities and the spatial distribution of the docking stations explain this data analysis. Docking stations are typically only found in areas of interest, and as history shows, the areas of interest historically exist in areas of higher wealth. The exception to this can be found in the regions that are in the beginning phases of rehabilitation and revitalization. This process has shown that it will typically lead to or be associated with gentrification.

There are several discussions around the for the placement and locations of docking stations. The most significant factor that can be found is that stations are placed in areas in which the infrastructure for bicycle usage exists or will exist in the future. Municipalities are continuously faced with concerns of promoting bicycle usage into their communities but receive backlash when the infrastructure isn't present or is done poorly. Bike share systems tend to become discussed or considered after the infrastructure has been installed, very seldom is this found in the reverse order. Until infrastructure is installed in areas less wealthy, operators are going to be less inclined to provide docking stations. If a station isn't able to support itself financially, then the location of the station is not desirable. Just like the dockless program, there are many pros and cons to the docked system. A brief overview of the pros and cons can be found in Table 2 below.

PROS:	**CONS:**
Less expensive full day ride access	Shorter ride times unless a member
Limits the disruption of the public right of way	Expensive startup costs
Established background with many case studies present	Limited city access due to number of stations

Cellular device typically not needed	Unequal access across the community
Faster bike wrangling and redistribution	

Table 2: Pros and Cons to Docked Systems
Table by author.

Part Two: Case Studies

This paper will examine domestic and international examples of bike share systems of varied scales. The following case studies represent cities that are larger than the City of Muncie, but follow key factors of comparison. These include similar characteristics in weather, proximity in program size (desirable size is later noted in the Grant Section of this document), is a college/university city, and then whether the program is driven or operated by the university or local government. The following are the programs and locations are addressed in the creative project:

- MoGo – Detroit, Michigan
- Nice Ride – Minnesota
- Explore Bike Share – Memphis, Tennessee
- The Pacers Bike Share – Indianapolis, Indiana
- Cincinnati Red Bike – Cincinnati, Ohio
- CoGo – Columbus, Ohio
- Ohio State – Columbus, Ohio
- University Hospitals – Cleveland, Ohio
- Bublr Bikes – Milwaukee, Wisconsin
- Healthy Ride – Pittsburgh, Pennsylvania
- Call-A-Bike – Germany

MoGo – Detroit Michigan

First proposed in 2012 at the Wayne State University Office of Economic Development, MoGo is a docked program that is backed by the City of Detroit by becoming a local nonprofit affiliate to the city. MoGo strives to serve a wide range of people and needs through affordable pass and payment options, programming that promotes health and wellbeing, safety, and connectivity to the community. MoGo strives to tackle the equity issues that have been examined over the years with docked bike share systems in cities around the world. Within the first five months of deployment in 2017, MoGo surpassed their expectations by over 200% (MoGo, n.d.). Their success is likely contributed to the annual access pass offered at $5 for individuals within income constraints. The pricing is to ensure that the bike share is affordable and accessible to all. Nearly one in five MoGo members has the access pass, which is proving that MoGo is providing a critical transportation option for hundreds of people within their city limits (Ready to Ride, Detroit?, n.d.).

Mission:	**Vision:**
To deliver an active transit system of on-demand bikes to serve a wide range of people and needs.	To be the nation's best in class bike share program and a catalyst in making Detroit a leader in Mobility.

Figure 12 Mogo docking station (Feuer, 2018)

Nice Ride – Minnesota

Nice Ride Minnesota is a nonprofit organization that was set up to oversee the dockless and docked bike share program that was established in the Twin Cities Metropolitan Area. The operator is a company named Motivate. Nice Ride, under input from Motivate, is currently tackling one of the issues including, impeding of the public right-of-way with the implementation of parking zones that are dedicated to the dockless bikes (Nice Ride Minnesota Parking Zones (Virtual Station) Master Plan, 2018). This approach has shown indifferent responses from the general public as this implementation begins to defeat the concept of dockless bikes while at the same time securing the public right-of-way for clear passage. Issues aside, Nice Ride has proven to be an asset to the community as they continue to increase their inventory to over 3,000 bikes and 400 stations (NiceRide, n.d.).

Mission:
To enhance the quality of life by providing convenient, easy to use bike sharing and fleet programs that will offer residents and visitors a healthy, fun, different way to get around town.

Figure 13 Nice Ride docking station. Minneapolis (Nice Ride MN-62, n.d.)

Explore Bike Share – Memphis, Tennessee

Explore Bike Share was established in Memphis, Tennessee at the end of May in 2017 with 600 bicycles and 60 stations. The background of Explore Bike Share is entirely community-driven after learning that getting a publicly-driven bike share system operated by the local government would not launch. In just one year, there was so much support from the community the local nonprofit organization overseeing the program that is supplied by B-Cycle, a manufacturer of bike share bicycles, was already looking to increase their inventory to 900 bicycles by the end of 2019 (Maxey, 2018). Like many other docked bike share programs which saw a lack of equity, Explore Bike Share took the necessary steps by making sure that memberships and access were an affordable rate. While prices are not as low as other systems that are available around the world, Explore Bike Share is securing their future with $5 per month memberships. In a city that has faced many economic disparities and struggles of equity, Explore Bike Share took matters into their own hands with the help of local companies, organizations, and community members to make sure that there was an additional form of transportation for the community, that is affordable (Explore Bike Share, n.d.).

Memphis Bike Share Model:
Driven by an advertising firm and a cadre of multi-sector stakeholders, rather than the government itself.

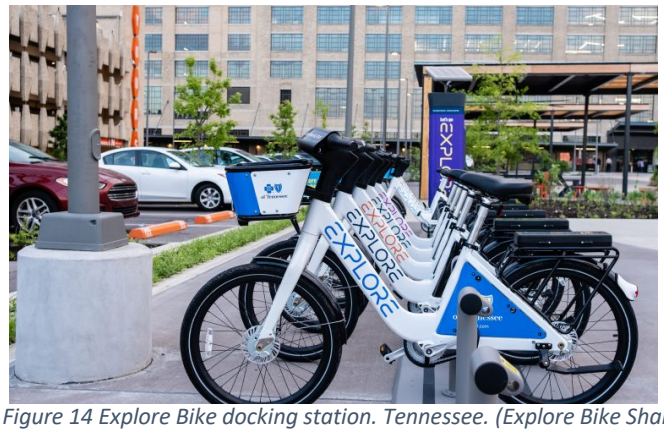

Figure 14 Explore Bike docking station. Tennessee. (Explore Bike Share, 2019)

The Pacers Bike Share – Indianapolis, Indiana

Designed for Commuters and visitors to the City of Indianapolis, The Pacers Bike share program has been celebrated as one of the more convenient forms of transportation. This can largely be attributed to the docking stations being distributed in a grid form that makes it more streamlined for commuters than using the local bus system. The Pacers Bike Share program is named after the local NBA team, The Pacers and was funded through the Herb Simon Family Foundation. There is also the presence of a very successful bicycle infrastructure within the city that allows cyclists to have a sense of safety. Downtown Indianapolis is home to the cultural trail, an eight-mile, world-class walking and bicycle path that connects several neighborhoods and cultural hotspots (Corbin, n.d.). At only 250 bikes in inventory, Pacers Bike Share is one of the smaller inventory systems for a city of its size. However, Indianapolis is very well supported and advocated in the world of cycling and lets the existing infrastructure and organizations showcase the bike advocacy that is present within Indianapolis. Organizations like the Indianapolis Cultural Trail, Inc., who oversees the Pacers Bike Share, plays a vital role in the community as they make it possible for Pacers Bike Share to provide bikes that are specially designed for the user and city travel (Indiana Pacers Bike Share, n.d.).

Figure 16 Pacers Bike Share and Cultural Trail (Bennett, 2018)

Cincinnati Red Bike – Cincinnati, Ohio

Red Bike is arguably one of the newest and one of the most fun systems available to Cincinnati for public transport. Initially, the program was created in 2014 with only 30 stations but has quickly grown to 57 stations with 442 bikes. Red Bike is dedicated to improving the community by providing a low cost, healthy, and green transportation that makes Greater Cincinnati a more vibrant and connected community. With places like the downtown, Over-the-Rhine, and Uptown neighborhoods offering destinations and amenities, Cincinnati partnered with B-Cycle to bring bike share to the community. Red Bike continues to thrive thanks to the vital sponsorships and partnerships, such as local hospitals, established in their early stages of implementation. A crucial partnership was seen within their first year, where they created an opportunity for individuals who were within any of the CityLink programs to gain access to the bike share program at a reduced cost. CityLink is a social service organization that is established to harness the potential power of individuals and guide them on the right path of success. Red Bike surpassed their first year goal by over 200%, with over 115,000 rides in one year (Red Bike Launch Through 2015, 2015).

Figure 17 Red Bike along the River (Explore on Cincy Red Bikes, n.d.)

CoGo – Columbus, Ohio

With the help of Motivate in 2013, Columbus took their ideas and put it to work by making sure that 24 hours a day, 7 days a week, 365 days a year, their community has access to fun and reliable form of transportation. CoGo is comprised of 597 bikes and 72 stations (CoGo Bike Share About, n.d.). However, CoGo addressed the issue of docking points when returning a bike. CoGo committed more than double the number of docking slots to the number of bikes. There is observed use and bike traffic in the local historic districts, riverfront trails, new development, and parks with the assurance of ample docking stations (Cruise Columbus on Two Wheels, n.d.).

Figure 18 CoGo Docking Station (Warren, 2018)

Ohio State – Columbus, Ohio

Rather than collaborate with the local government and the CoGo team, in 2015 Ohio State sought a different source tailored to the needs and wants of their student population. Ohio State partnered up with Zagster, a bike share company specializing in programs for colleges and universities. The program offers 115 bicycles that are conveniently located within the campus environment. Zagster offers a successful and thriving atmosphere to the students of Ohio State as the program allows for students to navigate campus and surrounding neighborhoods. Zagster provides a one-hour checkout on weekdays and three hours on weekends (Office of Energy and Enviornment, 2013). By providing longer checkout times, Zagster's campus division has allowed for Ohio State to be distinguished as most programs limit the rider to 30-60 minute sessions at any time during the week before additional fees occur. Zagster also assures that their bikes contain the safety features necessary for users to lock the bike for a mid-ride coffee or food break without concerns of theft or another potential rider taking the bike (Transportation and Traffic Management, n.d.).

Figure 19 Ohio State's bike share docking station (Neil and 11th Bike Share Station Closed Due to Construction, 2016)

Bike Cleveland – Cleveland, Ohio

The Bike Cleveland nonprofit was created under the partnerships of University Circle Inc. and the Blue Lake Institute who formed a task force under the City of Cleveland's Sustainability office in the hopes of creating a bike share program. This task force then funded a study and determined that they were suited for 700 bikes at 70 stations throughout their downtown and University Circle. Bike Cleveland sought out federal funds that kick-started programs that were established in cultivating matches and attention from the community. In 2015, the City of Cleveland received over a 20% of the total funds that the Northeast Areawide Coordinating Agency (NOACA) received to distribute to various projects (Cleveland Bikeshare: UHBIKES, n.d.). One year later, these funds and other partnerships allowed for the establishment of 250 red bikes across the city. While the bike share program continues to exist, they face challenges that have risen with the influx of scooter sharing (Working for Safe Streets, n.d.).

Figure 20 Presentation of UH Bikes (University Hospitals to Name Cleveland's Bike Share, n.d.)

Bublr Bikes – Milwaukee, Wisconsin

Bublr Bikes is a nonprofit organization established in 2014 that aims in breaking the barriers of so called bikers being the only users of bike share. Milwaukee has seen a majority of its riders and member, since being established, being first-time two-wheel travelers within their city. Bublr provides well-maintained bicycles and theft proof stations in four different municipalities that make up the Greater Milwaukee area: Milwaukee, Shorewood, Wauwatosa, and West Allis, Wisconsin. Bublr has seen excitement and usage within their areas of service that they shall commence studies and testing for electric assisted bicycles in the hopes of encouraging individuals who need extra assistance in biking around the community (Jannene, 2019). Included with a study, conducted in the summer of 2019 is a proposed expansion of 26 more stations to provide access to low-income communities in the hopes of delivering equity amongst the Great Milwaukee Area. Bublr also encourages their members that biking isn't just an activity for the warm months, but year round. They do this by assuring that their bikes are ready and equipped for the winter months and challenge their riders to take part in activities like the Bublr Winter Bike Challenge to receive prizes such as a free memberships (Bublr Bikes, n.d.).

Figure 21 Bublr Bikes Wauwatosa (Minske, 2016)

Healthy Ride – Pittsburgh, Pennsylvania

Healthy Ride is a public bike share system that serves Pittsburgh through 50 stations that house 500 bicycles. The system is owned and operated by Pittsburgh Bike Share, a local nonprofit. The bikes are provided by Nextbike, a German-based company. This program came to exist through efforts of many different politicians, business leaders, the city, and advocates of Pittsburgh Bikes who pursued a substantial grant from the Federal Highway Administration in efforts of congestion mitigation and air quality improvement (CMAQ). Upon acceptance of the grant, several foundations, local business, and anonymous donors stepped up to cover the planning and capital costs that were required as match towards the federal funds. In four years, Healthy Ride grew to 175 stations with over 700 bicycles being used throughout the city. This growth can be contributed to their concern in making sure that they were appealing to the neighborhoods and communities in which their docking stations do or do not reside in, as seen through the immense number of public outreach meetings. Expansion of their program came from the input and suggestions gathered at the public meetings as the individuals in which use the system reside within these communities. By taking the inputs and demands of the community into consideration, Healthy Ride can achieve their goal of promoting community engagement through ridership (Healthy Ride, n.d.).

Figure 22 Healthy Ride docking station (Blazina, 2018)

Call-A-Bike – Germany

Deutsche Bahn (DB) is a rail company but has a division that provides a bike share program called Call a Bike, is a multi-city program that spans across Germany. The success of DB can largely be attributed to the bicycle centered lifestyle that has grown in Central Europe over the past 50 years. While the automotive industry continues to thrive within Germany, the usage of bicycles continues to grow within the city centers. Access to bike share bikes in Germany is done with almost zero struggle as it is nearly impossible to go a block or two without locating one of the DB bikes. DB bicycles and nearly every other competitor that provide bike shares in Germany offer dockless vehicles. In Germany, dockless bikes can and do become a nuisance to pedestrian foot traffic, fellow cyclists, and even motorists due to the abundance of over 13,000 bikes (DB Call a Bike, n.d.). Germans have shown that their lifestyle choices and dependency on the Call-A-Bike service will supersede any of the issues in which the bicycles present to the cities in which the operate in (Call a Bike, n.d.).

Figure 23 Call-a-Bike docking station (Rudolf, 2013)

Part Three: Program Determination & Federal Grant

Program Determination

Disclaimer: the author of this creative project is disclosing that they do hold a bias and do advocate the concept of docked programs over dockless. The information to follow within this portion of the creative project shall only include thoughts and ideas that were shown and discussed within the previous two parts of this project.

There are a few main points that stand out for both the dockless and docked bike share programs, and they can be seen represented in the following table:

Docked Program:	**Dockless Program:**
Designed for destination of destination travel	Exploration of wide/broad areas
Overall, startup costs and maintenance costs are more expensive	Cheaper startup cost but more costly for daily usage
Designed for specific areas with bicycle infrastructure	Issues pertaining to theft and vandalism
Established rules and regulations and more case studies to reference for implementation	+/- issues related to the ability to terminate a ride anywhere

When examining the Ball State University campus and the City of Muncie, the docked program appears to be a better fit, even though the program is more expensive. Strategies for overcoming the cost of the program will be explained within the final section of this creative project.

Ball State University (BSU) and the City of Muncie offer many different locations that are commonly visited by both the student population and residents of the city. These areas are typically places that are frequented almost daily. While BSU and the City of Muncie have several amenities to offer, the amenities and locations are points of interest and are at greater distances from each other. This means that an individual is more inclined to go from a starting location to their destination without exploring or stopping between the two locations and docking stations. This is attributed to the fact that individuals are mindset in reaching their destination, more specifically when there aren't points of interest between where they started and are ending. Docked programs are designed for areas of interest or places where individuals commute

whereas the dockless program gives the rider the ability to explore as they can terminate their ride anywhere haphazardly. This brings about the next point of bicycle infrastructure for consideration.

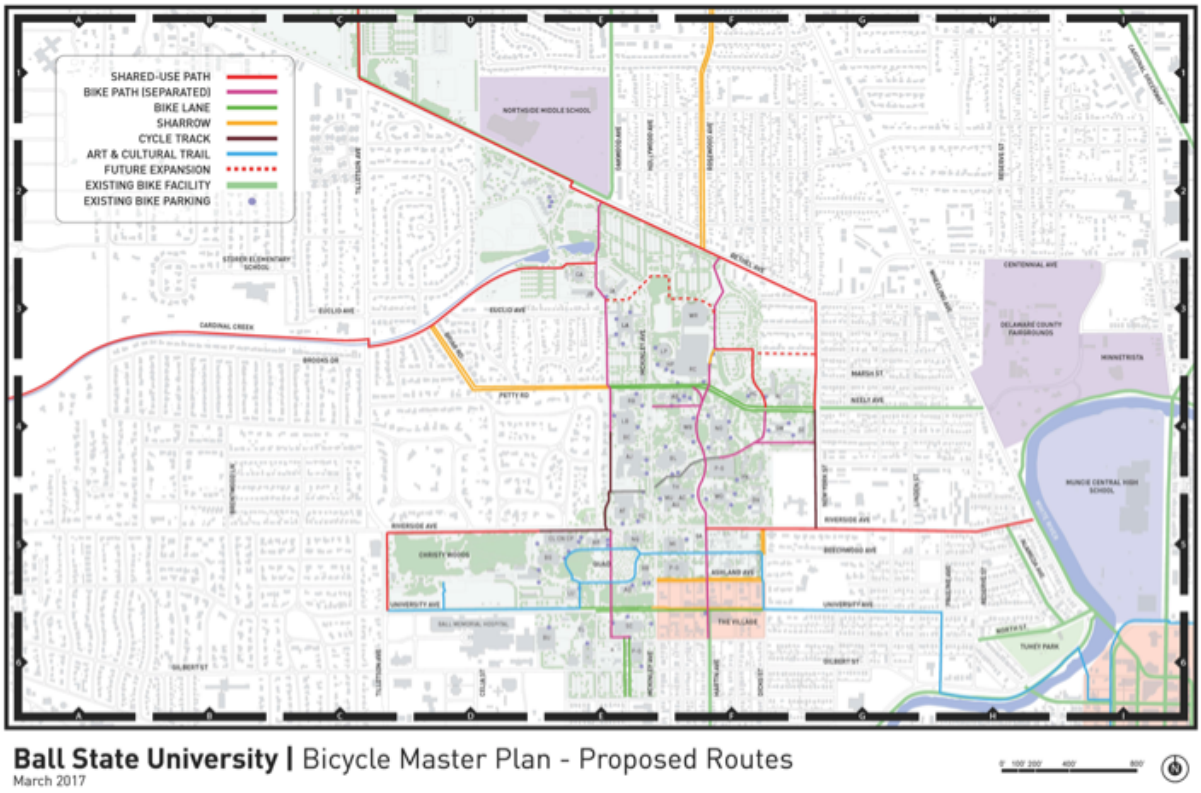

Figure 24 BSU proposed bicycle routes (Rundell Ernstberger Associates/ City of Muncie)

At the time of this document, Ball State University and the City of Muncie are in the early phases of approving a plan and implementing several projects of bicycle infrastructure not only on the campus but around the city as a whole as shown in Figure 24 and 25. The current inventory of bicycle infrastructure is limited. The infrastructure that is present was brought forth through public outreach meetings and were designed and placed in locations that pertain to the areas in which the residents and students frequent. Ridership in these areas is limited and in some cases not encouraged as the safety of the rider could be at risk. Arguably, a docked system that is strategically placed along the current bicycle infrastructure and places of interest, BSU and the City of Muncie could encourage bicycle usage to and from several locations. Until the bicycle

infrastructure grows to cover more of the city, the usage of a docked program alongside its current areas of infrastructure will secure more regular usage of a bike share program.

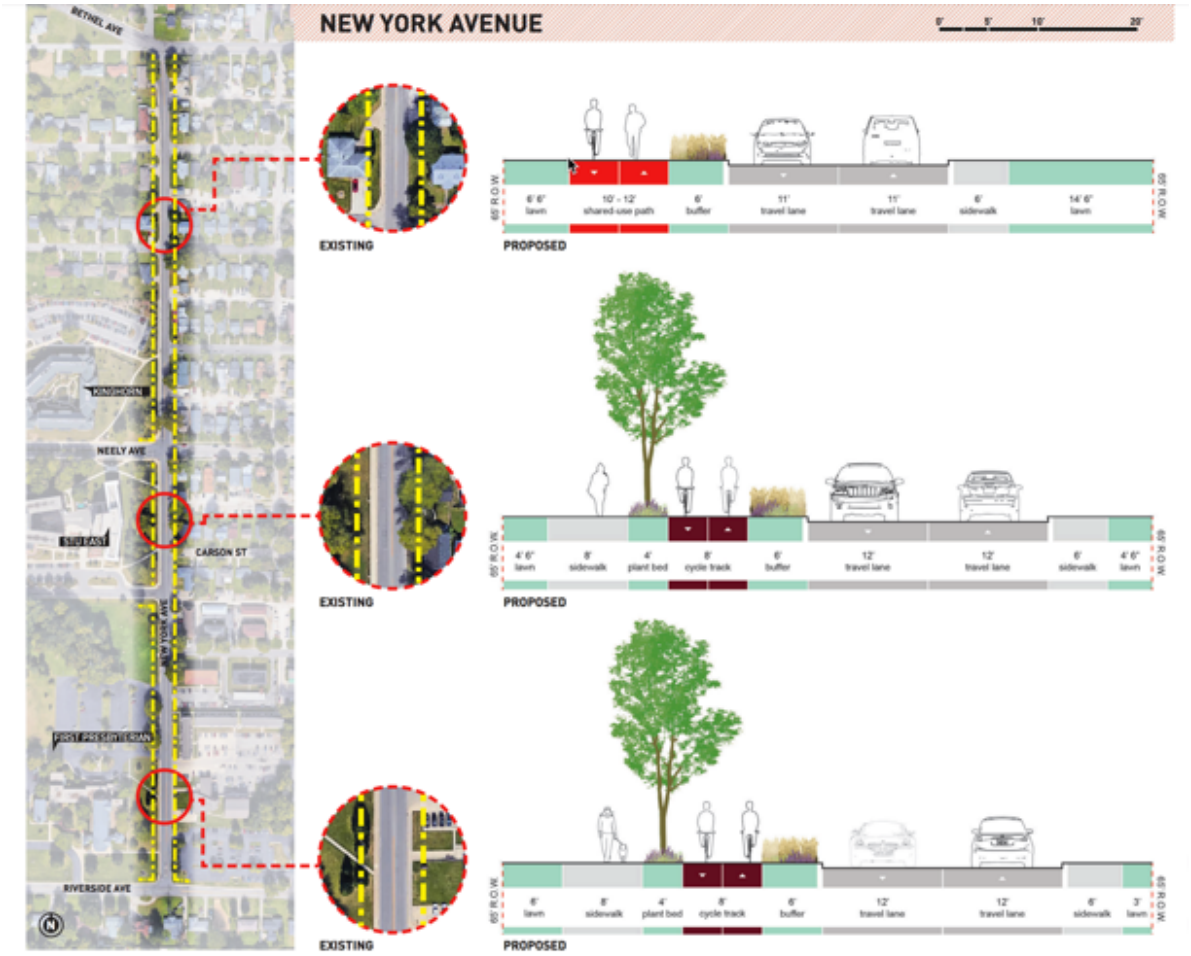

Figure 25 New York Avenue, Muncie Bicycle Infrastructure proposal (Rundell Ernstberger Associates/ City of Muncie)

Docked bike share programs, as seen throughout this document, have been around longer than the dockless programs. Docked programs contain more cases studies and examples to draw inspiration, conclusions, and help from at any point during the process. For example, there are plenty of case studies that can be examined for tackling the issues surrounding the high costs associated with the docked program, which brings us to the next point.

Many docked programs examined in this creative project were started under the guidance of advocate groups from wide ranges of backgrounds or a local municipality. No matter the size

of the group or organization, they were all faced with the dilemma on how to fund the program in question. While some turned to local donors, foundations, and organization, most programs contained a source of funding that came through different levels of grant sources. This shall be examined in the final portion of this creative project.

The section to follow is an application on behalf of Ball State University with the partnership of the City of Muncie for a federal grant from the U.S. Department of Transportation. The full grant procedure, application summary, and an outline can be found at Grants.gov by searching the code G4910-9X, or a portion of the application summary can be found under Appendix E. The application is written in accordance to the outline and specifications that were provided by the U.S. Department of Transportation. This grant application was produced to secure the funds to be used towards the establishment and implementation of Ball Bikes over the first five years upon receiving funds in the first months of 2020. This application is to be submitted by July 15th 2019.

Federal Grant

DEPARTMENT OF TRANSPORTATION
Better Utilizing Investments to Leverage Development (BUILD) Grant

Ball Bike: A Smart Dock Bike Share
Submitted by: July 15th 2019

City of Muncie
300 N. High St.
Muncie, IN 47305

Ball State University
2000 W. University Ave
Muncie, IN 47306

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PROJECT DESCRIPTION

Starting the fall of 2016, Ball State University (BSU) began creating and updating its Bicycle Master Plan through several different procedures, including partnership meetings, public input sessions, and online surveying. Also included in the study was a partnering with the City of Muncie to explore how a bike share program could be established in the city as well as on and around the University's campus. A bike share program would allow for an additional form of public transportation at a relatively reasonable usage fee for the residents, students, and visitors to the city and BSU. This transportation option would increase the connectivity between the businesses and services that are located downtown to BSU just a few miles northwest as well as other parts of the city. The implementation of a bike share program would increase the visibility of bicycling while providing healthy recreational opportunities that would help leverage future investment in bicycle facilities and off-street trails. Under the supporters and officials like the former Mayor Dennis Tyler, Muncie and BSU have proven to have the drive and commitment of increasing the bicycle community and the in-betterment of the community as a whole. Included in this commitment was conduction of a feasibility analysis by Toole Design Group (TDG). The study was concluded and presented to BSU in June of 2017.

Muncie is located in east-central Indiana along the White River and is home to a yearly population of 70,000, excluding BSU Students. Once known for its industrial and manufacturing sectors, Muncie has adjusted with time to be driven by their educational and health services. For example, the two largest employers within Muncie are Ball Memorial Hospital and Ball State University. The city holds a relatively low density and feels suburban except for a few mixed-use areas such as the University Village south of the campus and a handful of locations along Walnut Street in the downtown. The City of Muncie offers many popular visitor locations in and around

the downtown that include the Children's Museum, Tuhey Pool, The John Craddock Wetland, and expansive travel spaces including the Cardinal and White River Greenways.

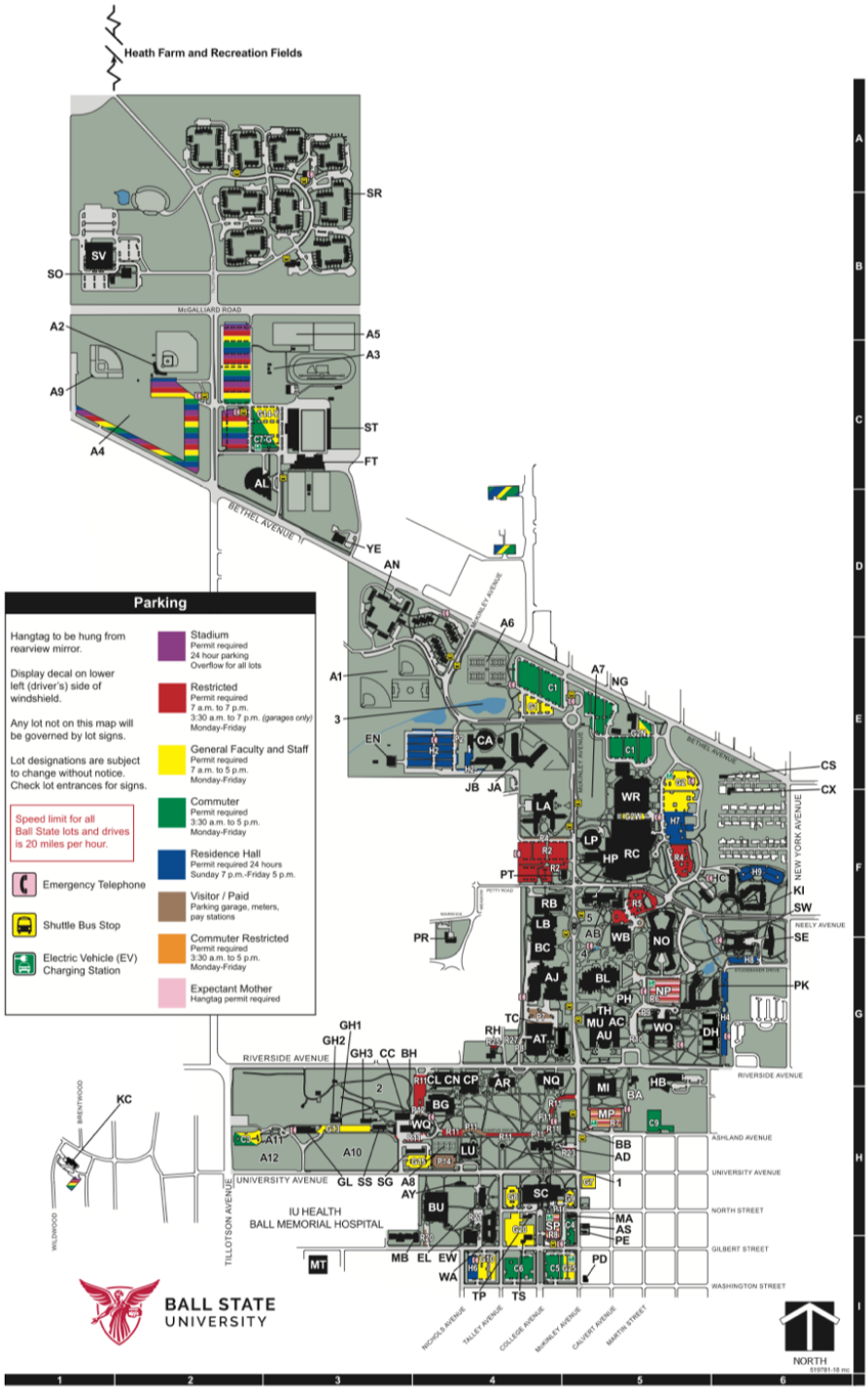


Figure 26 Campus Map (Campus Map, n.d.)

Ball State is a public university that contains several highly ranked programs/colleges including the School of Nursing, Education, School of Business, and College of Architecture and Planning. Yearly enrollment has seen a steady increase over the years and sat just under 22,000 enrolled students in 2016, 4,000 being online registered students. For the students that do reside in Muncie, there are several locations in which students travel to and from on a weekly if not daily basis. Areas include the University Green, Bracken Library, Scheumann Stadium, Recreation Center, and many local shops and business located within the Village and the downtown. The university's campus is laid out in a north to south, disjointed line, with the densest portions of the campus located near the Shafer Tower and Pittenger Student Center, both located adjacent or on North McKinley Avenue and West University Avenue. Throughout the college campus, there are ten dormitory buildings containing 31 different residence halls. At the time of publication, the residence halls hold enough space to house approximately 7,000 students, with 40% of undergraduate students living on campus per the Office of Campus Life. However, there is a large amount of student apartment-style housing located in the northern portion of the university.

According to the Visit Indiana Tourism site (Honest-to-Goodness Economic Benefit, n.d.), BSU plays a significant role in pulling tourists and visitors to the City of Muncie. BSU itself attracts many alumni and visitors alike to the many campus attractions whether for athletic events, Greek Life, or entertainment. The tourism that is brought to Muncie represents over $90 million into the local economy, according to the 2014 study that evaluated the economic impact of tourism in Indiana.

Bike share programs are typically successful among students, given that they have a higher dependency on transportation, environmental consciousness, and the eagerness to

embraces new and evolving technology. Bike share programs are more significant than just a form of transportation and offer a multitude of mobility, community building, and a wide range of economic, health, environmental, and safety benefits. Some of the significant benefits include:

- An additional transportation option that could tackle the first and last mile and reduce dependence on automobile transportation.
- Provide BSU students and staff an opportunity to get to, from, and around campus; connecting the university to the many off-site attractions and destinations.
- Introduce beginning and new riders to the benefits of bicycling such as physical, mental health, and well-being.
- Build upon the city's and university's reputation as a forward-thinking and bicycle-friendly community, and promote the city to potential employers, residents, and visitors.

As per the BUILD Grant guidelines, this project does not have a direct correlation with transportation to, from, and within rural communities as the area of operation does not fall within a rural area, as per the 2010 Census Urban Areas Map (2010 Census Urban Area Reference Maps, 2010). The plan in pursuance is the creation of Ball Bike Smart Dock Bike Share program, a two-phase, 25 station, 250 bike program that will exist and operate within the city and campus limits. However, some station locations will encourage and promote the usage of the Cardinal Greenways, which do extend outside of the city and Delaware County limits.

Cardinal Greenways is dedicated to enhancing the quality of life by developing and operating corridors and trails to connect people and communities. Opened in 1993, the Cardinal Greenway purchased 60 miles of the former railroad corridor from CSX Transportation Corporation to develop a rails-to-trail recreation linear park covering five counties in eastern Indiana (About Cardinal Greenways, n.d.). In 2018; the Cardinal Greenways celebrated its 25th anniversary while being inducted into the Rails to Trails Conservancy Hall of Fame. The Cardinal Greenway stands as the longest continuous recreational trail found within Indiana. The future vision of the Greenway is that it will span East Central Indiana, from Richmond to Gas City. The trail system

will be ongoing, without breaks, and will eventually link to trails in Illinois and Ohio. The system will be easy to reach, simple to navigate, and safe to use, with regular maintenance, sound security, and connection to community destinations along the route. As a public resource, Cardinal Greenways offers education wellness programs, environmental awareness, and recreation for a wide range of audiences.

In the past five years, the City of Muncie, Delaware County, and BSU have been taking the necessary steps of providing a better and safer experience for pedestrians and cyclists in the community. Completed in 2019, the Delaware-Muncie Bicycle Pedestrian Plan will continue efforts of the county to encourage more biking and walking within each of the surrounding cities and towns as well as Muncie. The plan examined necessary goals of the community in the hopes of increasing safety and mobility of residents who bike and walk or wish to bike and walk within the area. The project engaged residents and community leaders to provide recommendations that seek to improve pedestrian and bicycle circulation. The plan's recommendations focus on infrastructure improvements, as well as policy and program updates to support and encourage pedestrian/bicycle travel. The process of the plan included a review of the existing conditions and documents and public input for infrastructure improvements and policy changes.

The City of Muncie and Ball State University find themselves in an area in which fellow college towns and neighboring cities indirectly challenge them in matching the advances in secondary transportation. Muncie and Ball State have responded with their own goals and efforts from other locations with the pursuance of the master plan as previously mentioned. While the creation of infrastructure are the most costly side of encouraging bicycle and pedestrian transportation, education serves as the most essential and crucial part of the success story. The existence of infrastructure does not mean that cyclists will appear. The process of educating the

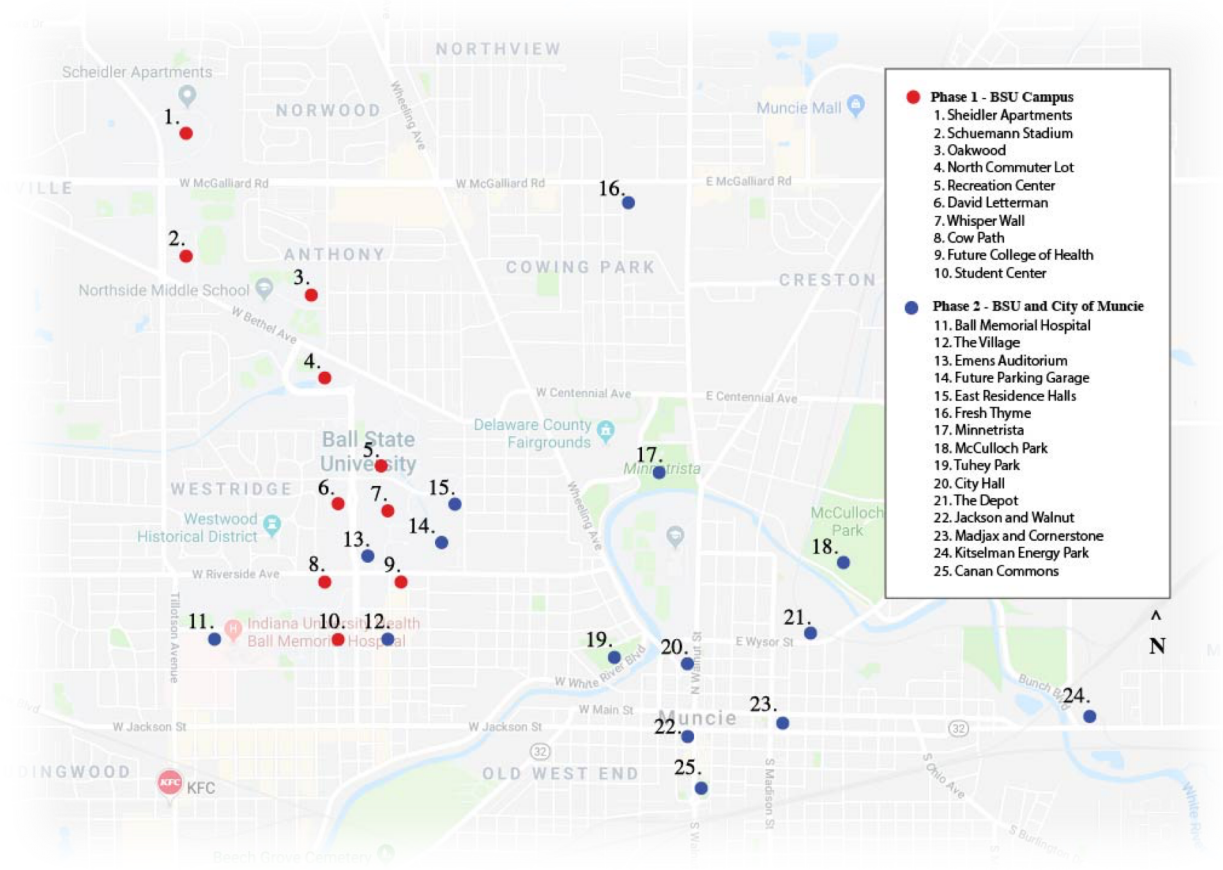
public regarding the infrastructure and the benefits of cycling is what will bring the most significant increase in cycling transportation. This includes personal usage of a bike share program in the community. For this reason, contained within the BUILD Grant application is a component that covers the necessary education steps for the highest success rate of a bike share program in the community.

PROJECT LOCATION

As mentioned within the project description, the docked bike share program will be implemented within the City of Muncie and the campus of Ball State through two different phases. The first phase will introduce 10 stations throughout the campus. The second phase will include 15 more stations throughout the city of Muncie, primarily downtown with a few exceptions of docks on the northern and eastern side of Muncie. Five of the second phase stations will also be implemented back on the BSU campus in the areas that were not targeted in the first phase. Map 1 provides in detail the location of each dock and in which phase it would be implemented. For a further breakdown of the phases and the number of bicycles/docks provided, refer to Table 1.

Location	**# of Stations**	**# of Docks**	**# of Bikes**
Ball State Phase 1	10	170	100
Ball State Phase 2	5	85	50
City of Muncie Phase 2	10	170	100
Total:	**25**	**425**	**250**

Table 1: Proposed Number of Stations, Docks, and Bikes



Map 1: BSU - The City of Muncie | Proposed Bike Share System Created by author

The locations that are present on the campus grounds have strategically been selected from the points of interest that have been expressed in the different public input meetings that were held during the conduction of the BSU Bicycle Master Plan. These spots were also in conjunction to where riders have been observed or have expressed interest in riding. For example, #8 was strategically placed along the so called cow path as it is frequently utilized as a connecting corridor between the northern and southern part of campus. Riders will typically use this path as it involves that least amount of foot and automotive traffic. As the reader will note, there have strategically been stations placed along McKinley as an additional traffic controller, advocating for a slower passage of speed as well as potential future closure of the stretch of

McKinley between Petty and Riverside. Phase two of the BSU campus includes an addition of the eastern residence halls, a future parking garage, and the IU Ball Memorial hospital where students are commonly coming and going from within the School of Nursing. However, it is essential to note that the University is currently undergoing many different construction plans and additions, and phase two may have to adjust to accompany these changes. This could include additional stations and/or position changes.

This project does not directly impact the transportation of rural communities. However, this project does create a connection from BSU and Downtown Muncie to the award-winning, nationally ranked rails-to-trails greenway known as the Cardinal Greenway. This greenway serves as a recreational trail for many users from within and beyond the county and surrounding rural areas. By placing a string of stations from the campus and downtown to points of the ridership of the greenway, riders will have more ability and encouragement of experiencing the trail and the rural communities that reside along the 62 miles of trail.

GRANTS FUNDS, SOURCES, AND USES OF ALL PROJECT FUNDING

Under Appendix A, the reader will find a budget breakdown of the initial startup costs and infrastructure, which provides the initial capital funding needed for a smart-dock bike share system. The reader will note that the capital funding needed is only listed as 2.75 million dollars. It is essential to realize that this cost is only a portion of what it takes to operate a bike share program appropriately. Shown in Appendix B, one will see the reoccurring fees that are going to be necessary for the success of a program over the first five years of implementation. This includes salaries, marketing and outreach, tuition, and legal and labor expenses. It is the reoccurring expenses, capital funding, and operating costs (Appendix C), that allows for Ball State to exceed the $5,000,000 minimum monetary donation as set for by the application guidelines. A further breakdown of the reoccurring operation costs can be found in Appendix D.

The total monetary request of $5,249,000 is being produced as to cover the operating costs, the operating shortfall, and the initial capital funding necessary to produce the Smart Dock Bike Share program over the first five years as seen in Table 2 and Appendix E. The initial cost of the program is the most expensive part of the program at 2.75 million dollars and would be utilized within the first three years of the program. On average, the recovery that a bike share program tends to see on the operation costs is approximately 30%. However, there is a possibility of additional revenue available as the program operator could have the ability to add on an additional fee to their student population tuition. This is a reoccurring source of income that will never dissipate as long as the program is in existence. As seen through other universities and programs alike, this fee could range from $2.50

Table 2	
Capital Funding	$2,750,000
Operating Costs	$1,435,000
Operating Shortfall	$1,064,000
Total:	**$5,249,000**

- $5 per student with the potential ability to generate 55,000 – 105,000 dollars per year in additional revenue, decreasing the operating shortfall each year.

Ball State University

Ball State University is a significant contributor and driver of this project by assuming daily operations. Included within this responsibility would be the hiring of a Bicycle Coordinator that would oversee the entirety of the project and future growth, communicating with the County and City level governments, as well as future endeavors the University chooses or seeks to pursue with bicycle related activities, tasks, etc.

Other expenses by BSU include general operating staff. In the case of a smart dock, private owned system, operation staff would consist of bike mechanics, IT staff capable of working the with computer systems located with the stations, bike wranglers, and general office personnel. Some of these positions could be cross-referenced in other areas of staffing at the university, but BSU would ultimately hold the decision over this. Ball State also retains the ability to hire student employees as every year, a fraction of students seek employment through on-campus jobs. While there would still need to be an apprentice in each sector, there is an ability to lower the yearly reoccurring expenses through student employment. Other positions, such as legal and general office staff are needed, but BSU currently holds people under these titles and would not need to create new positions/salaries to fulfill these needs unless there is a concern with quotas and tasks being met under current conditions.

County and City Organizations

In-kind contributions or matches can come from non-BSU organizations as well. Organizations would include IU Ball Memorial Hospital, local foundations, local bicycle advocates and organizations, and longtime supporters of community improvement like Old National Bank. Funds from these organizations can bridge the gap of the operating shortfall through sponsorship opportunities from marketing and investment into the program following the first five years. There are also capabilities of working with the local governments when it comes time to create the final Smart Dock Bike Share master plan. Using grants that are available through the county and city government about transportation, the cost of the third party master plan could be covered, and the program would match the parameters/specifications as set for by all parties involved.

Graduate School

While these funds do come from Ball State in the long run, this expense is separated as these funds would be through the Graduate School of Ball State. More specifically, the funds would be through the yearly cost of tuition for graduate school, this point being just over $9,000 per year. This is not including the semester stipends that are allocated to each student as being a graduate assistant within a particular department of the University. The stipend is dependent on a budget of the department in which the student works.

Departments in question would include the Urban Planning Department, Marketing, Health, and the IT Technical Services. The positions that the students would fulfill would be program creation for health tracking for students and faculty as well as the community, ridership data collection, research, and marketing for sponsorships and outreach. Again, this can be cross-

referenced in other areas of contributors, but the final decision will fall under the hands of the Graduate School and Ball State University.

MERIT CRITERIA

Safety

With the introduction of a bike share program, the percentage of ridership will increase. This, in terms, means that there will be more of a visual representation of cyclists out on the roadways and trails around the community. The more prominent visual representation will alone create more awareness of the surroundings by vehicle users, in terms meaning that the number of vehicular bicycle accidents will decrease each year. By increasing the presence of cyclists in the community, the safety of not only themselves but that of vehicle users as the speeds on roadways would begin to adjust with the increase of cyclists and bicycle infrastructure.

State of Good Repair

This project can increase the state of the other existing transportation locations that are found within the City of Muncie and BSU Campus. Current forms of transportation other than vehicular traffic would be the two bus systems utilized by both students and residents. As referenced before, the bike share program will be able to solve the first and last mile issues that are noticeable with different forms of public transit. The creation of a bike share program will also create an incentive for the city and county to develop new and improve existing bicycle infrastructure as in the long run more, and improved infrastructure shall better the community and also increase the ridership each year.

Economic Competitiveness

This project is not intended to create economic competitiveness within the first years of implementation, as there will be a higher need for infrastructure improvements and growth to accommodate the bike share program. Only when infrastructure and the bike share program coexist in harmony will there be the possibility for economic competitiveness within and around the surrounding communities.

Environmental Protection

This project shall fulfill transportation needs with less pollution found in the air within the vicinity of Muncie and BSU. This is attributed to the fact that more people would be inclined to use the other forms of public transport, knowing if their first or last mile is more achievable. In terms of students, student usage of the bike share program won't mainly affect the environment as most students tend to already walk to and from campus and their homes. However, the usage of the bike share program by students to get to and from other locations off campus would have a positive impact on the air quality. For example, there is an ability to limit the number of students that are being taxied to and from campus by their roommates. There is also the contribution of groundwater contaminants produced by vehicles, and as more people move to bicycles, fewer pollutants will be prevalent and found within the natural environment such as the White River that separate the campus and downtown.

Quality of Life

The quality of life is primarily impacted through the forms of health rather than that of jobs and expanded services of the community. While bike share is a form of transportation, it is

also seen as a form of recreational activity. Whether using it for transportation or recreational activity, users of the program will experience health incentives. No matter the length of the ride in distance or time, there is more health benefits experienced than that of someone who is using a motor vehicle to get to and from locations. This, in terms, increases the quality of life in of individuals that experience the bike share program.

Innovation Technologies

Through the introduction of the bike share program, Ball State University intends to employ a team of graduate students from a variety of departments as previously mentioned in the funding section of this application. To repeat, these teams of graduate students would be used to create health tracking programs that would work with the bike share program. This technology would be available for students to create an account where they could share their goals and then create a plan in which how many rides, times, and distances in which they would need to do to achieve their goals. This technology would be available over time and not necessarily available from day one as the graduate student positions would not come open until the creation of the program. This program would work along side the the Human Performance Lab that currently exists on the campus where students are able to test the physical strength, weakness, and body composition. Only until the creation of the program will there be new technology advances other than that of the program in general.

Partnership

As mentioned in the section above in the fund allocation section of this grant, some partnerships that precede this grant include BSU, Ball Memorial Hospital, local organizations,

and business that support the concept of biking within the community as seen through documents like MAP3 that contain sections in promoting health through bicycle usage (Banning, et al., 2018). A thorough, detailed list of these organizations can be found on the Bike Muncie page (Bike Muncie, n.d.). Such businesses include restaurants, grocers, and attractions found within Muncie. Larger partnerships, however, can be found with the IU Ball Memorial Hospital and Old National Bank, both significant contributors to events that are held around the community. These two contributors could retain the largest sponsorship of the bike share program as they hold the ability to cover startup costs as well as being the secondary faces of the bike share program.

PROJECT READINESS

As previously mentioned, sponsorships and partnerships have been examined when considering the future of Delaware County and Ball State University in the eyes of bicycle infrastructure. Delaware County and the City of Muncie have shown through their actions in creating the 2019 Bicycle and Pedestrian Master Plan that they are inclined to grow their bicycle and pedestrian footprint within the community. Similarly, Ball State shows their stand in the matter as they continue their process in creating a bicycle master plan of the university. With their Urban Planning Department, there is no shortage of individuals who hold the knowledge of putting this program on the initial steps of progression. With the existing group of members advocating for the program including Ball State, the County and City Government, it is hereby advocated to start and run Ball Bikes, a smart dock bikeshare program.

APPENDIX

Appendix A – Capital Funding and Start-up Costs

Smart Dock Implementation and 5 - Year Budget							
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Stations	-	10	-	15	-	-	25
Bikes	-	100	-	150	-	-	250
Capital and Start-Up Cost - Smart Dock							
Equipment	$500,000	-	$750,000	-	-	-	$1,250,000
Start Up	$250,000	-	$250,000	-	-	-	$500,000
Infrastructure	$500,000	$250,000	-	$250,000	-	-	$1,000,000
Capital Funding Needed	$1,250,000	$250,000	$1,000,000	$250,000	-	-	$2,750,000

Appendix B – Reoccurring Expenses over 5 Years

**Recuring Expenses and Pre Initiation Expenses							
Master Plan Creation	$75,000	-	-	-	-	-	$75,000
Bike Cordination	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$300,000
Outreach / Marketing	$25,000	$10,000	$10,000	$10,000	$10,000	$10,000	$75,000
Graduate Assistants	-	$27,000	$27,000	$27,000	$27,000	$27,000	$135,000
Mechanics	-	$70,000	$70,000	$70,000	$70,000	$70,000	$350,000
Operation Staff	-	$70,000	$70,000	$70,000	$70,000	$70,000	$350,000
Fringe Benefits	$10,000	$28,000	$28,000	$28,000	$28,000	$28,000	$150,000
Operating Costs	$160,000	$255,000	$255,000	$255,000	$255,000	$255,000	$1,435,000
Total 5 -Year Cost							

Appendix C – Operation Costs over 5 Years

*Operating Costs							
Operating Costs	-	$160,000	$160,000	$400,000	$400,000	$400,000	$1,520,000
Recovery Average	-	30%	30%	30%	30%	30%	30%
User Revenues	-	$48,000	$48,000	$120,000	$120,000	$120,000	$456,000
Operating Shortfall	-	$112,000	$112,000	$280,000	$280,000	$280,000	$1,064,000

Appendix D – Reoccurring Expenses Breakdown

*Operating Cost							
Smart Dock	Phase 1	Phase 2	Total				
$1,600	100 Bikes	150 Bikes	250 Bikes				
(Bike / Year)	$160,000 / Yr	$250,000 / Yr	$400,000 / Yr				
**Recuring Expenses and Pre Initiation Expenses							
Operation Staff	-	2 @ $35,000	2 @ $35,000	2 @ $35,000	2 @ $35,000	2 @ $35,000	$350,000
Mechanics	-	2 @ $35,000	2 @ $35,000	2 @ $35,000	2 @ $35,000	2 @ $35,000	$350,000
Fringe Benefits	-	20% - $7,000 x 4	20% - $7,000 x 4	20% - $7,000 x 4	20% - $7,000 x 4	20% - $7,000 x 4	$140,000
Bike Coordinator	1 @$50,000	1 @$50,000	1 @$50,000	1 @$50,000	1 @$50,000	1 @$50,000	$300,000
Fringe Benefits	20% - $10,000	20% - $10,000	20% - $10,000	20% - $10,000	20% - $10,000	20% - $10,000	$60,000
Graduate Assistant	-	3 @ Tutition (9,000)	3 @ Tutition (9,000)	3 @ Tutition (9,000)	3 @ Tutition (9,000)	3 @ Tutition (9,000)	$135,000

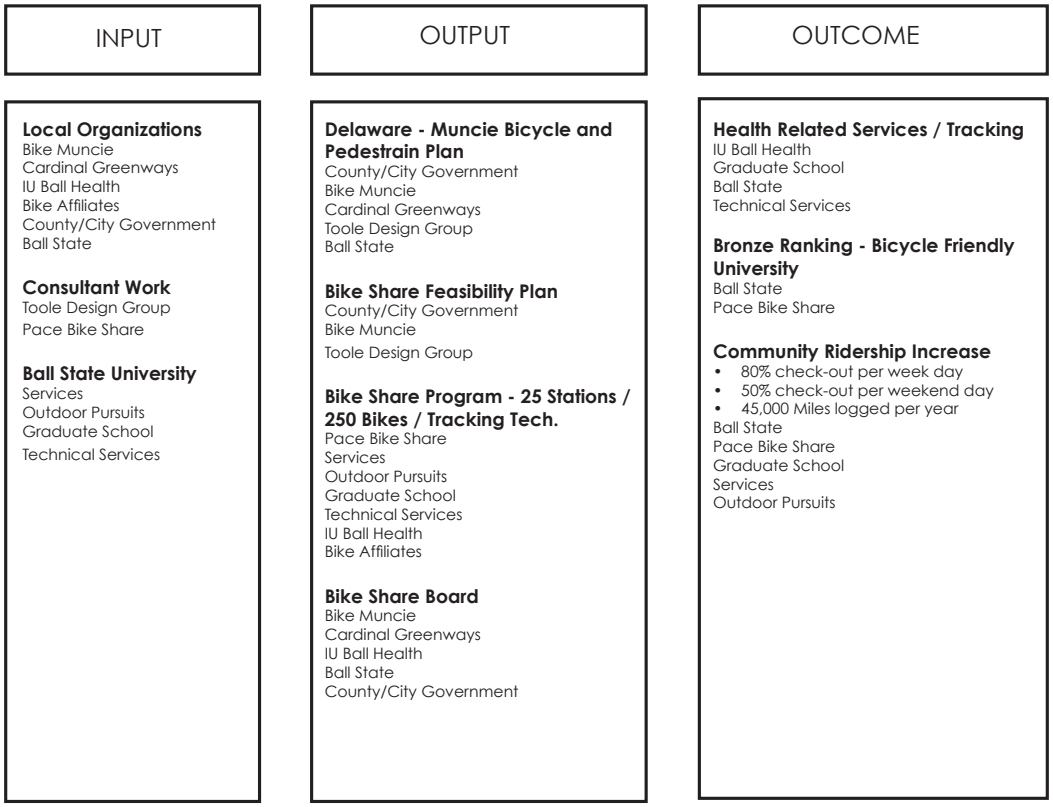
Appendix E – Total Cost Analysis

Total 5 -Year Cost	
Operating Shortfall	$1,064,000
Operating Costs	$1,435,000
Capital Funding Needed	$2,750,000
Total:	$5,249,000

SUPPLEMENTAL MATERIAL

Logic Model

Ball State University - Muncie, IN
SMART DOCK BIKE SHARE PROGRAM



Promotional and Marketing Material

Figure 27 Ball Bike promotional and market material logos. Created by author

APPLICATION FINAL PAGE.

Appendix

Appendix E: Federal Grant Guidelines

G4910-9X

DEPARTMENT OF TRANSPORTATION

Office of the Secretary of Transportation
Notice of Funding Opportunity for the Department of Transportation's National Infrastructure Investments under the Consolidated Appropriations Act, 2019

AGENCY: Office of the Secretary of Transportation, DOT

ACTION: Notice of Funding Opportunity

SUMMARY: The Consolidated Appropriations Act, 2019 (Pub. L. 116-6, February 15, 2019) ("FY 2019 Appropriations Act") appropriated $900 million to be awarded by the Department of Transportation ("DOT") for National Infrastructure Investments. This appropriation stems from the program funded and implemented pursuant to the American Recovery and Reinvestment Act of 2009 (the "Recovery Act") and is known as the Better Utilizing Investments to Leverage Development, or "BUILD Transportation grants," program. Funds for the FY 2019 BUILD Transportation grants program are to be awarded on a competitive basis for surface transportation infrastructure projects that will have a significant local or regional impact. The purpose of this notice is to solicit applications for BUILD Transportation grants.

DATES: Applications must be submitted by 8:00 PM E.D.T. on July 15, 2019.

ADDRESSES: Applications must be submitted through Grants.gov.

FOR FURTHER INFORMATION CONTACT: For further information concerning this notice, please contact the BUILD Transportation grants program staff via e-mail at BUILDgrants@dot.gov, or call Howard Hill at 202-366-0301. A TDD is available for individuals who are deaf or hard of hearing at 202-366-3993. In addition, DOT will regularly post answers to questions and requests for clarifications as well as information about webinars for further guidance on DOT's website at www.transportation.gov/BUILDgrants.

SUPPLEMENTARY INFORMATION: The FY 2019 BUILD Transportation grant program will make awards to surface transportation infrastructure projects that will have a significant impact throughout the country. Each section of this notice contains information and instructions relevant to the application process for these BUILD Transportation grants, and all applicants should read this notice in its entirety so that they have the information they need to submit eligible and competitive applications. For this round of BUILD Transportation grants, the maximum grant award is $25 million, and no more than $90 million can be awarded to a single State, as specified in the FY 2019

Appropriations Act. Per statute, the FY 2019 selection criteria are the same as under the FY 2017 TIGER program, although the description for each criterion has been updated. For FY 2019 BUILD Transportation grants, the definitions of urban and rural areas differ from previous rounds. Additionally, not more than 50 percent of funds will be awarded to projects located in urban and rural areas, respectively.

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